

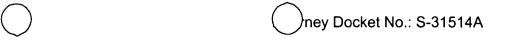
THAT WHICH IS CLAIMED IS:

1. A method of producing a transformed dicotyledonous plant, comprising:

- (a) culturing a tissue of a dicotyledonous plant recalcitrant for transformation on a culture medium to produce a multiple shoot culture from the tissue;
- (b) introducing a nucleic acid into a cell of the multiple shoot culture, thereby producing a transformed cell comprising the nucleic acid; and
 - (c) regenerating a transformed plant from the transformed cell.
- 2. The method according to Claim 1, wherein the tissue is meristematic tissue.
- 3. The method according to Claim 2, wherein the meristematic tissue is excised from a shoot apex, an axillary bud or a floral meristem.
- 4. The method according to Claim 1, wherein the tissue is callus tissue.
- 5. The method of Claim 1 wherein the plant is a member of the *Cucurbitaceae* family or of the *Chenopodiacea* family.
- 6. The method of Claim 1 wherein the plant is selected from the group consisting of sugar beet, sunflower, soybean, cotton, melons, watermelon, squash, *Brassica* and pepper.
- 7. The method of Claim 1 wherein the plant is sugar beet, squash, melon or watermelon.
- 8. The method of Claim 1 wherein the tissue is excised from the shoot tip of a seedling of the plant.



- 9. The method of Claim 1, wherein the culture medium comprises at least one plant growth regulator.
- 10. The method of Claim 9, wherein the at least one plant growth regulator is a cytokinin.
- 11. The method of Claim 9, wherein the concentration of growth regulator in the culture medium is between about 0.01 mg/L to about 25 mg/L.
- 12. The method of Claim 1, wherein the nucleic acid is introduced into the cell by microparticle bombardment or using a bacterium belonging to the genus *Agrobacterium*.
- 13. The method of Claim 1, wherein the nucleic acid comprises a nucleic acid that is heterologous to the dicotyledonous plant.
- 14. The method of Claim 1, wherein the nucleic acid comprises a gene that encodes a polypeptide having PPO activity.
- 15. The method of Claim 1, wherein the nucleic acid comprises a gene that encodes a polypeptide having phosphomannose isomerase (PMI) activity.
- 16. The method of Claim 1, wherein the nucleic acid comprises a gene that encodes a polypeptide having xylose isomerase (xylA) activity.
- 17. The method of Claim 1, wherein the nucleic acid comprises a gene that encodes a polypeptide having GUS activity.
 - 18. The method of Claim 1, wherein step (c) comprises: selecting a multiple shoot culture comprising a transformed cell;



growing the multiple shoot culture under conditions that promote shoot elongation to produce at least one transformed shoot; and then growing the at least one transformed shoot into a mature transformed plant.

- 19. The method of Claim 18 wherein the at least one transformed shoot grows into a mature transformed plant after growing the at least one transformed shoot on a medium that promotes root formation.
- 20. The method of Claim 1, wherein the step (c) comprises: selecting a multiple shoot culture comprising a transformed cell; growing the multiple shoot culture under conditions that promote shoot elongation to produce at least one transformed shoot;

cloning the at least one transformed shoot; and allowing the cloned shoot to mature into a transformed plant.

- 21. The method of Claim 20 wherein the cloned shoot grows into a mature transformed plant after growing the cloned shoot on a medium that promotes root formation.
 - 22. A transformed plant cell produced by the method of claim 1.
 - 23. A multiple shoot culture produced by the method of claim 1.
 - 24. A transformed plant produced by the method of claim 1.
- 25. The transformed plant according to Claim 24, wherein the plant is a squash plant that expresses a polypeptide having PMI activity.
- 26. The transformed plant according to Claim 24, wherein the plant is a melon plant that expresses a polypeptide having PMI activity.



- 27. The transformed plant according to Claim 24, wherein the plant is a watermelon plant that expresses a polypeptide having PMI activity.
- 28. The transformed plant according to Claim 24, wherein the plant is a sugar beet plant that expresses a polypeptide having PPO activity.
- 29. A seed produced by the transformed plant of Claim 24, wherein the seed comprises the nucleic acid transformed into the multiple shoot culture.
- 30. A method of producing a plant comprising a transformed plastid genome, comprising:
- (a) culturing a tissue of a plant on a culture medium to produce a multiple shoot culture from the tissue;
- (b) introducing a nucleic acid into a plastid genome of a cell of the multiple shoot culture, thereby producing a transformed plastid genome of said cell comprising the nucleic acid; and
 - (c) regenerating a transformed plant from the transformed cell.
- 31. The method according to Claim 30, wherein the tissue is meristematic tissue.
- 32. The method according to Claim 30, wherein the meristematic tissue is excised or derived from a shoot apex, an axillary bud or a floral meristem or leaf tissue.
- 33. The method according to Claim 30, wherein the tissue is callus tissue.
- 34. The method of Claim 30 wherein the plant is a dicotyledonous plant.



- 35. The method of Claim 30 wherein the dicotyledonous plant is sugar beet, tobacco or tomato.
- 36. The method of Claim 30 wherein the tissue is excised from the shoot tip of a seedling of the plant.
- 37. The method of Claim 30, wherein the culture medium comprises at least one plant growth regulator.
- 38. The method of Claim 37, wherein the at least one plant growth regulator is a cytokinin.
- 39. The method of Claim 37, wherein the concentration of growth regulator in the culture medium is between about 0.01 mg/L to about 25 mg/L.
- 40. The method of Claim 30, wherein the nucleic acid is introduced into the cell by microparticle bombardment.
- 41. The method of Claim 30, wherein the nucleic acid comprises a nucleic acid that is heterologous to the dicotyledonous plant.
- 42. The method of Claim 30, wherein step (c) comprises: selecting a multiple shoot culture comprising a transformed cell; growing the multiple shoot culture under conditions that promote shoot elongation to produce at least one transformed shoot; and then growing the at least one transformed shoot into a mature transformed plant.
- 43. The method of Claim 42 wherein the at least one transformed shoot grows into a mature transformed plant after growing the at least one transformed shoot on a medium that promotes root formation.

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44. The method of Claim 30, wherein the step (c) comprises: selecting a multiple shoot culture comprising a transformed cell; growing the multiple shoot culture under conditions that promote shoot elongation to produce at least one transformed shoot;

cloning the at least one transformed shoot; and allowing the cloned shoot to mature into a transformed plant.

- 45. The method of Claim 44 wherein the cloned shoot grows into a mature transformed plant after growing the cloned shoot on a medium that promotes root formation.
- 46. A transformed plastid genome produced by the method of claim 30.
 - 47. A plastid comprising a transformed plastid genome of claim 46.
 - 48. A transformed plant cell comprising a plastid genome of claim 46.
 - 49. A transformed plant comprising a plant cell of claim 48.
- 50. A seed produced by a transformed plant of claim 49, wherein the seed comprises the nucleic acid transformed into the multiple shoot culture.